

HINGE HARDWARE ELEMENT FOR DOORS AND WINDOWS OF BUILDING AND FURNITURE

The invention relates to a hinge hardware element for building and furniture doors and windows, the panels of which when opened are supposed to leave the inside cross section of the doorway or window opening entirely clear. The hardware element has a fastening part to be attached to the jamb and a bearing-surface part to be attached to the door panel, and these parts are connected to one another via a lever mechanism.

Door hinge hardware which more or less satisfies this requirement is in use in many forms. A failing common to the majority of such hardware is that it does not clear the inside cross section of the doorway entirely, since at least some relatively small parts of the hardware protrude into the opening. Two constructions which differ in their function must also be distinguished from one another in this respect. One construction provides that the door panel is swung open only to an angle of 90° , in which case the end face of the door panel then in fact swings out of the way of the inside cross section of the opening, but it is impossible to open the door more fully, such as to an angle of about 180° . In the second type of construction, the panel can be swung open about an angle of 180° , and when thus fully open the end face of the door panel does in fact swing out of the inside cross section—but not when the door is opened to a lesser angle, such as only 90° .

In view of the above, it is the object of the invention to create a hinge hardware element of the general type described above but which entirely clears the inside cross section of the door or window opening when the panel is swung open about an angle of 90° as well as 180° —and of course any angle between these two limits. Hinge hardware elements of this type generally comprise a fastening part to be attached to the door or window jamb and a bearing-surface part to be attached to the door panel, these parts being connected to one another via a lever mechanism. The attainment of this object depends upon successfully embodying the hinge hardware element as a whole such that all its parts are sunk in recesses in the jamb when the door or window is closed, while when the door or window is opened these parts emerge not in the direction of the inside cross section but only in a direction perpendicular thereto.

In a hinge hardware element of the above general type, this object is attained in that the lever mechanism comprises two 4-bar link mechanisms, one of which originates with the fastening part attached to the jamb and has two articulated shafts as a base and which is substantially embodied by one arm of a bell-crank lever, one curved lever and one coupler connecting the two via articulated shafts, and the other of which originates with the bearing-surface part disposed on the end face of the door panel and has two articulated shafts as a base and which is substantially embodied by the other arm of the bell-crank lever, a swing arm and the coupler with the associated articulated shafts. The two 4-bar link mechanisms have a positive kinematic connection with one another via the common bell-crank levers, the common coupler and at least one common articulated shaft. All the parts of the hardware element are countersunk in recesses of the jamb or of the end face of the door panel when the door is closed, and the 4-bar link mechanisms are embodied and disposed such that when the

door is opened, the second 4-bar link mechanism emerges from its recesses substantially at right angles to the adjacent wall or to the narrow side of the jamb.

With the dimensions of the individual members of the mechanism being selected in accordance with the intentions of one skilled in the art, the embodiment and disposition of this lever mechanism has the desired result that in no phase of the entire process of opening the door do any members whatever of the mechanism protrude into the inside cross section of the opening, whether the door is opened to an angle of 90° , 180° , or any angle between these two limits.

Having great significance for the function of the lever mechanism in accordance with the invention is the provision that the swing arm of the second 4-bar link mechanism engages the common coupler with a third articulated shaft, which is disposed spaced apart not only from the articulated shaft common to the two 4-bar link mechanisms but also from the further articulated shaft of the first 4-bar link mechanism.

In a preferred form of embodiment, it is provided that the three articulated shafts are disposed on the coupler at the corners of a triangle, preferably an isosceles triangle. The result then is that upon the actuation of the hinge hardware, that is, when the panel hinged to it is opened or closed, both 4-bar link mechanisms are pivoted in one rotational direction while the triangular coupler is pivoted in the opposite rotational direction.

As already mentioned in general terms, the jamb or the body of the door or window frame has one or more recesses on the long edge adjacent to the door panel, at least in the area where the brackets are fastened. These recesses receive the entire lever mechanism including both 4-bar link mechanisms when the door or window is in the closed position, the first arm of the bell-crank lever and the curved lever being located approximately parallel to one another and spaced closely apart from one another.

The bell-crank lever is preferably embodied such that the articulated shafts, which pass through the free end points of the bell-crank lever and its apex, are located in the corners of an acute, preferably isosceles triangle, the acute angle of which is located on the base shaft. As a result of this embodiment, it is attained that the pivot radius for the bell-crank lever can be very small.

In a simple form of embodiment for less stringently demanding uses, it may be provided that the bell-crank lever and the curved lever are disposed in one plane, while the coupler and the swing arm are disposed in another plane parallel thereto.

For more stringent demands, a symmetrical embodiment of the hinge hardware appears to be more useful; the bracket serving as the fastening means then has a congruent second bracket associated with it, the second bracket being disposed on the door jamb at a vertical interval from the first bracket such that it is possible to insert the lever mechanism between the two brackets by means of the base shafts passing through both brackets.

The two brackets are embodied as substantially U-shaped hardware parts, one arm of each U serving to fasten them to the jamb and the other arm of each U forming, with the base shafts, the base of the first 4-bar link mechanism.

In a similar manner it is provided that the bearing-surface part, which is at the same level as the levers of the first 4-bar link mechanism, is embodied as substantially U-shaped; with one arm of the U, it is fastened to the end face of the door panel, while the other arm of the U